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Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.   (Currently amended) A method comprising steps of:

A) deriving a suspect region exhibiting problematic data structure evolution in a running application;

B) periodically traversing only selected subgraphs of the suspect region to a depth of one, in order to detect data structure changes, wherein a data structure is a subgraph of an object reference graph snapshot and the subgraph comprises nodes that own constituents;

C) characterizing the data structure changes;

D) updating a histogram of the suspect region with the characterizations of the data structure changes, wherein updating the histogram comprises:

1) allocating one row for each suspect region; and

2) storing, for each suspect region:

a ranking of the suspect region;

a proxy-size of the suspect region; and

a summary of attributes of a last change detected and previous n changes detected;

wherein storing the summary of attributes comprises:

i) classifying the suspect region as a monotonic grower if only

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addition updates were detected;

       ii) classifying the suspect region as an oscillator if a substantially equal distribution of addition and removal updates were detected;

       iii) classifying the suspect region as a shrinker if only removal updates were detected; and

       iv) classifying the suspect region as a flatliner if no updates were detected;

E) using the characterized data structure changes to describe, characterize, and identify an evolutionary trend of the suspect region as a whole; and

F) reporting the characterized changes to the region to an analysis agent.

2.   (Cancelled)

3.   (Original) The method of claim 1 used to detect one of the following changes to a region: additions to a region; removals from a region; and internal restructuring within a region.

4.   (Currently amended) The method of claim 1 wherein step B) further comprises selecting the selected subgraphs to traverse ~~are derived~~ by

    computing region keys for the constituents of the data structure; and

    identifying a unique set of paths from owner proxy to change proxy as the set of traversals.

5.   (Previously presented) The method of claim 4 wherein the traversals are shortened by

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identifying a subpath of a path which is unlikely to change as the region evolves; and

trimming the path to exclude parts of the path which are unlikely to change.

6. (Previously presented) The method of claim 1 wherein determining how the suspect region evolves is a continuous and adaptive process.

7. (Previously presented) The method of claim 6 wherein the process is made continuous and adaptive by

identifying a set of desired updates; and

adjusting an interval in between traversals based on whether the desired updates have been witnessed.

8. (Previously presented) The method of claim 6 wherein the process is made continuous and adaptive by

identifying a set of desired updates; and

adjusting a frequency of sampling any one traversal based on whether that traversal has detected desired updates.

9. (Currently amended) The method of claim 6 wherein the process is made continuous and adaptive by implementing one of the following procedures based on the result of performing a traversal: adding new traversals; removing existing traversals; and modifying ~~the~~ a path of existing traversals.

10. (Currently amended) The method of claim 1 further comprising

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G) updating qualitative characterizations of the suspect regions under analysis based on structural changes to the regions as a whole.

11.   (Currently amended) The method of claim 1 further comprising

G) updating quantitative characterizations of the regions under analysis based on structural changes to the regions as a whole.

12-13 (cancelled)

14. (Previously presented) The method of claim 6 further comprising using the evolutionary trend to update rankings of regions exhibiting problematic data structure evolution.

15. (Canceled)

16. (Canceled)

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